

C L A I M S

1. A processing apparatus characterized by
2 comprising:
3 a vessel which accommodates a target object;
4 ultraviolet light-generating means for
5 outputting ultraviolet light or vacuum ultraviolet light
6 toward an atmosphere containing radicals in said vessel;
7 ultraviolet light-receiving means for
8 receiving the ultraviolet light or vacuum ultraviolet
9 light passing through the atmosphere; and
10 analysis control means for obtaining a density
11 of the radicals in the atmosphere on the basis of an
12 output signal from said ultraviolet light-receiving
13 means, to control a process parameter.

2. A processing apparatus according to claim 1,
2 characterized in that
3 said analysis control means obtains an
4 attenuation amount of the ultraviolet light or vacuum
5 ultraviolet light passing through the atmosphere on the
6 basis of the output signal from said ultraviolet
7 light-receiving means, and obtains the density of the
8 radicals in the atmosphere from the attenuation amount.

3. A processing apparatus according to claim 1,
2 characterized by comprising:
3 means for intermittently outputting the
4 ultraviolet light or vacuum ultraviolet light toward the

5 atmosphere and outputting an ultraviolet light
6 presence/absence signal indicating presence/absence of
7 the ultraviolet light or vacuum ultraviolet light; and
8 means for obtaining a difference calculated by
9 subtracting a light reception amount of said ultraviolet
10 light-receiving means obtained when the ultraviolet
11 light or vacuum ultraviolet light is absent from a light
12 reception amount of said ultraviolet light-receiving
13 means obtained when the ultraviolet light or vacuum
14 ultraviolet light is present on the basis of the
15 ultraviolet light presence/absence signal, and obtaining
16 the density of the radicals in the atmosphere from the
17 difference.

4. A processing apparatus according to claim 1,
2 characterized by comprising means for causing the
3 ultraviolet light or vacuum ultraviolet light output
4 from said ultraviolet light-generating means to pass
5 through a plurality of optical paths and to be received
6 by said ultraviolet light-receiving means.

5. A processing apparatus according to claim 4,
2 characterized by comprising modulators arranged to said
3 optical paths respectively and having modulation
4 frequencies that are different from each other.

6. A processing apparatus according to claim 1,
2 characterized in that
3 said vessel has a window through which the
4 ultraviolet light passes, and

5 said window is heated.

7. A processing apparatus according to claim 1,
2 characterized in that

3 said vessel has a window through which the
4 ultraviolet light passes, and

5 said window has a cylindrical structure.

8. A processing apparatus according to claim 1,
2 characterized by comprising:

3 temperature measuring means for measuring a
4 temperature of molecular or atomic radicals in the
5 atmosphere, and

6 said analysis control means controls the
7 process parameter on the basis of the output signal from
8 said ultraviolet light-receiving means and a measurement
9 result of said temperature measuring means.

9. A processing apparatus according to claim 8,
2 characterized in that said temperature control means
3 includes

4 laser beam generating means for generating a
5 laser beam toward the atmosphere,

6 laser beam receiving means for receiving the
7 laser beam passing through the atmosphere; and

8 analysis means for obtaining an attenuation
9 amount spectrum of the laser beam passing through the
10 atmosphere on the basis of an output signal from said
11 laser beam receiving means, and obtaining a temperature
12 of molecular or atomic radicals in the atmosphere from a

13 pattern of the attenuation amount spectrum.

10. A processing apparatus according to claim 9,
2 characterized by comprising:

3 means for intermittently outputting the laser
4 beam toward the atmosphere and outputting a laser beam
5 presence/absence signal indicating presence/absence of
6 the laser beam; and

7 means for obtaining a spectrum of a difference
8 calculated by subtracting a light reception amount of
9 said laser beam receiving means obtained when the laser
10 ultraviolet beam is absent from a light reception amount
11 of said laser beam receiving means obtained when the
12 laser beam is present on the basis of the laser beam
13 presence/absence signal, and obtaining a temperature of
14 the molecular or atomic radicals in the atmosphere from
15 a pattern of the spectrum.

11. A processing apparatus according to claim 8,
2 characterized in that said temperature measuring means
3 measures a light emission spectrum of the molecular or
4 atomic radicals in the atmosphere, and obtains a
5 temperature of the molecular or atomic radicals in the
6 atmosphere from an obtained spectrum pattern.

12. A processing apparatus according to claim 9,
2 characterized by comprising means for causing the laser
3 beam output from said laser beam generating means to
4 pass through a plurality of optical paths, and to be
5 received by said laser beam means.

13. A processing apparatus according to claim 12,
2 characterized by comprising modulators arranged to said
3 optical paths respectively and having modulation
4 frequencies that are different from each other.

14. A processing apparatus according to claim 9,
2 characterized in that
3 said vessel has a window through which the
4 laser beam passes, and
5 said window is heated.

15. A processing apparatus according to claim 9,
2 characterized in that
3 said vessel has a window through which the
4 laser beam passes, and
5 said window has a cylindrical structure.

16. A processing apparatus according to claim 1,
2 characterized in that the radicals are atomic radicals.

17. A processing apparatus according to claim 16,
2 characterized in that the atomic radicals include any
3 one element selected from Si, N, O, F, H, and C.